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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/701,185

11/04/2003

Zhenan Bao

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08/01/2005

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EXAMINER

GEBREMARIAM, SAMUEL A

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 08/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary	Application No. 10/701,185	Applicant(s) BAO ET AL	
	Examiner Samuel A. Gebremariam	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12 and 15-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 12, 15, 17-21 and 23-28 is/are allowed.
- 6) ☒ Claim(s) 16, 22 and 29-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 22 and 33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification has support for the existence of through holes in the dielectric layer. However there is no support in the specification for a step of providing through holes.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 22 and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It appears from the disclosure that the through holes (pin holes) exist in the dielectric layer and are inherent property of the dielectric layer. It is not clear how one is able to provide through holes (pin holes) as claimed in claims 22 and 33.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16 and 29-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivasan US patent No. 5,731,235 in view of Tickle US patent No. 4,420,497.

Regarding claim 16, Srinivasan teaches a method of making an apparatus comprising a substrate (12) and a dielectric layer (14) comprising the steps of: providing a substrate (12); providing a dielectric layer comprising a first dielectric material (14) on the substrate (12) the dielectric layer having a dielectric layer thickness and being traversed by through holes (16) passing from an interface with the substrate to an opposite side of the dielectric layer (14) and providing a second dielectric material (22) that at least partially blocks the through holes (16).

Srinivasan does not explicitly teach the second dielectric material being applied to the opposite side of the dielectric layer while an electric field is applied to the substrate.

Tickle teaches the process of using voltage source (electric field, refer to fig. 2 and also col. 3, lines 50-69 and col. 4, lines 1-27) in the method of plugging pinhole (13).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the application of electric field taught by Tickle in the

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process of Srinivasan in order to expose more pinholes that will be filled during subsequent oxidation step.

Regarding claim 29, Srinivasan teaches substantially the entire claimed structure of claim 16 above including forming a semiconductor layer (54) on the dielectric layer (22).

Regarding claim 30, Srinivasan teaches substantially the entire claimed structure of claim 16 above including the thickness of the dielectric layer is within a range of between about 10 nanometers and about 5 microns (col. 3, lines 24-29).

Regarding claim 31, Srinivasan teaches substantially the entire claimed structure of claim 16 above except explicitly stating forming a source electrode and a drain electrode in a spaced apart arrangement on the semiconductor layer.

However Srinivasan teaches (col. 4, lines 41-47) that the structure formed above can easily integrated in conventional DRAM and other circuitry fabrication flows. The formation DRAM process inherently includes the process of forming a source and drain electrode in a spaced apart arrangement.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a source electrode and a drain electrode in a spaced apart arrangement on the semiconductor layer as claimed in the process of Srinivasan in order to integrate the device with other parts of an integrated circuit.

Regarding claim 32, Srinivasan teaches substantially the entire claimed structure of claim 16 above including forming a conductor (54) on the dielectric layer.

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Regarding claim 33, Srinivasan teaches substantially the entire claimed structure of claim 16 above except explicitly stating providing through holes having average diameters substantially smaller than an average spacing between mutually adjacent through holes.

Parameters such as deposition temperature and thickness in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired film quality during fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the deposition condition that would allow the creation of through holes with the dimensions as claimed in order to form a dielectric layer that is less prone to breaking down.

Allowance

6. Claims 12, 15, 17-21 and 23-28 are allowed.

Response to Arguments

7. Applicant's arguments filed 5/4/05 with regard to claim 16 have been fully considered but they are not persuasive. Applicant argues since Tickle teaches the application of a voltage across the dielectric to stress areas of latent defects so as to damage or modify these areas, and then forming defects to repair the defects, Srinivasan and Tickle, taken alone or in combination, fail to disclose and fail to suggest providing a second dielectric material that at least partially blocks through holes in a dielectric layer on a substrate, the second dielectric material being applied to an opposite side of the dielectric layer while an electric field is applied to the substrate.

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However the claim does not explicitly state that electric field is applied is used to plug the through holes using the second dielectric material. The electric field could be used for other purposes as far claim 16 is concerned. Since claim 16 does not directly correlate the application of the electric field and providing the second dielectric material to partially block the through holes, the process taught by Tickle can be appropriately combined with the process of Srinivasan in order to teach the claimed process of claim 16 above.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Steven Loke can be reached on (571) 272-1657. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG
July 19, 2005

Steven Loke
Patent Examiner